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Abstract

**HEAT TRANSFER PERFORMANCE OF THE POLYZONAL CAN
FOR THE C.E.G.B. REACTORS**

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The paper describes the heat transfer research undertaken by the Central Electricity Generating Board into the polyzonal fuel element. It outlines the problems which are of interest to the reactor operator and which make it necessary to obtain as accurate a correlation as is possible between laboratory data and the performance of the fuel element within the reactor.

The complex nature of both the fluid flow and the associated heat transfer processes around the polyzonal spiral surface which have previously eluded purely theoretical treatment have been investigated using a four times full scale model. The basic understanding which has been gained of these mechanisms is described in the paper and suggestions are made for improving the heat transfer performance of the surface.

Investigations into polyzonal heat transfer performance in the Laboratories have shown that results are critically dependent on the circumferential variation in thickness of the heater tube wall, accumulated effects of manufacturing tolerances and the presence of and errors in thermocouples. Other factors which have been investigated experimentally include the effects of flux peaking at the ends of the fuel elements and the differences between the end of a fuel element in a reactor and the electrically heated laboratory assembly.

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Measurements of the fuel element heat transfer parameters in a Berkeley Reactor are compared with laboratory results. The deterioration in performance which results from the creep deformation of fins, splitters and braces is discussed and an indication of magnitude of the effects is given. The case of a failed fuel element containing an oxide mound on the surface of the uranium bar has been considered and the thermal performance evaluated from an experiment in which the geometry is simulated and a comparison is made with the results from an analogue study.